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ABSTRACT

This report summarizes and compares findings of researchers' and teachers' opinions in six subject areas (literature, social studies, science, mathematics, music, and art) about ideal and actual elementary school curricula. Three researchers and three teachers participated in each subject area. Participants were asked to write detailed responses to a questionnaire eliciting views about actual and ideal curricula. Five- to 6-hour interviews were conducted regarding ideal curricula and opinions concerning the most widely used textbook series in participants' subject area. Analyses revealed that all participants agreed that existing curricula material should be revised to focus on a limited number of key understandings that might be taught in greater depth. Despite agreement about the faults of existing curricula, however, there was considerable difference of opinion about how to improve current practice. Teachers tended to approach curriculum planning with the child in mind; researchers approached planning with the discipline in mind. Another key distinction related to differences in how respondents viewed the nature of knowledge. (MM)

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COMMONALITIES AND DIFFERENCES IN VIEWS ABOUT IDEAL AND ACTUAL CURRICULUM IN SIX SUBJECT MATTER DOMAINS

Richard S. Prawat

Center for the Learning and Teaching of Elementary Subjects

Institute for Research on Teaching
College of Education
Michigan State University

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The work is designed to unfold in three phases, beginning with literature review and interview studies designed to elicit and synthesize the points of view of various stakeholders (representatives of the underlying academic disciplines, intellectual leaders and organizations concerned with curriculum and instruction in school subjects, classroom teachers, state- and district-level policymakers) concerning ideal curriculum, instruction, and evaluation practices in these five content areas at the elementary level. Phase II involves interview and observation methods designed to describe current practice, and in particular, best practice as observed in the classrooms of teachers believed to be outstanding. Phase II also involves analysis of curricula (both widely used curriculum series and distinctive curricula developed with special emphasis on conceptual understanding and higher order applications), as another approach to gathering information about current practices. In Phase III, models of ideal practice will be developed, based on what has been learned and synthesized from the first two phases, and will be tested through classroom intervention studies.

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Abstract

This report summarizes and compares the findings of six separate analyses of what expert researchers and teachers had to say about ideal and actual curricula at the elementary school level. Across the various subject matter domains studied--art, literature, mathematics, music, science, and social studies--some common findings emerged from these analyses. All experts agreed that existing curricula material should be revised to focus on a limited number of key understandings that might be taught in much greater depth than is currently the case. There was even some consensus within each subject matter domain about just what those understandings should be. Despite agreement about what is wrong with existing curricula, however, there was considerable difference of opinion about how to improve current practice at a more concrete level. Some of this difference reflects a difference in perspective between teachers and researchers: The former tend to approach curriculum planning more with the child in mind, the latter, with the discipline in mind. Another key distinction in accounting for different approaches cuts across the teacher/researcher boundary: This relates to differences in how experts view the nature of knowledge. The impact of this and other factors on curriculum planning and development is discussed.

COMMONALITIES AND DIFFERENCES IN VIEWS ABOUT IDEAL AND ACTUAL CURRICULUM IN SIX SUBJECT MATTER DOMAINS

Richard S. Prawat[1]

This report summarizes and compares the views of two sets of experts--researchers and teachers--regarding ideal curriculum in each of six subject matter domains at the elementary school level. The following subject-specific examinations of ideal curriculum have been drawn on in this report: Cianciolo and Prawat, 1990 (literature); Prawat, Brophy, and McMahon, 1990 (social studies); Roth, Eichinger, McMahon, and Prawat, 1991 (science); Prawat, Putnam, and Reineke, 1991 (mathematics); May, 1990 (music); May, 1993 (art). These individual studies were part of a larger effort aimed at identifying various classroom level factors that affect youngsters' understanding and ability to apply subject matter knowledge at the elementary school level.

A brief overview and rationale for the series of studies on "ideal curriculum" summarized and compared here is in order. An earlier review of the literature on the topic of teaching for understanding and promoting higher order thinking (Prawat, 1989) had identified the following as likely features of ideal elementary curriculum and instruction: (a) the curriculum balances breadth with depth by addressing limited content and developing it sufficiently to foster conceptual understanding; (b) content is organized around a limited number of powerful ideas (basic understandings and principles rooted); (c) teaching emphasizes the relationships or connections between these ideas (integrated learning); (d) students regularly get opportunities to

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process information actively and construct meaning; and (e) the curriculum fosters problem solving and higher order thinking skills in the context of knowledge application, relying on real-world situations for this purpose. The subject matter experts whose views are summarized here were asked to critique, qualify, and extend these ideas about ideal subject matter curriculum and instruction in one of a number of important subject matter areas (i.e., literature, social studies, mathematics, music, and art).

Two types of experts--researchers and teachers--were recruited in each of the six subject matter domains mentioned above. Three researchers and three teachers participated in each subject area. Researchers were selected because of their scholarly contributions and their familiarity with elementary school classrooms. Teachers were selected from among nominees suggested to us by leading scholars (including those who were being asked to participate in the study). Scholars were asked to nominate teachers who were outstanding at promoting understanding of the subject, including its higher level thinking and problem-solving aspects. These teachers were then interviewed by phone to develop more information about their teaching goals and methods. After being stratified to ensure balance between the primary and later elementary grades, the teachers who seemed most impressive in their phone interviews were invited to participate.

Data were developed from two sources. The first was a detailed, written document in which experts were asked to (a) critique and add to our list of key features of ideal curriculum (see above); (b) indicate how they would address three representative but important goals in the subject matter domain (for this part and the remaining part of the exercise, they were to pretend that they were acting as consultants assisting the staff of a local school); (c) list important understandings or generalizations related to each goal; and

(d) develop a scenario for teaching one of the understandings at each of two grade levels (second and fifth). All of the experts in the study were provided with the same set of instructions designed to elicit views about ideal curriculum. Within each subject experts were given the same general goals to develop for Grades 2 and 5. For example, one goal in science addressed by all experts was that of "developing an understanding of how living things interact with other living things and with their physical environment."

The second, extensive data source consisted of five-to-six hour interviews with experts; this not only allowed us to further probe experts' views regarding "ideal" curricula, it also afforded an opportunity for us to solicit their opinions regarding the most widely used current textbook series in their subject matter domain. This material, along with a set of framing questions, had been sent to each of the experts approximately one month prior to the on-campus interviews.

The procedure used in analyzing experts' written and interview responses was as follows (all interviews were tape recorded and subsequently transcribed): First, a minimum of three researchers--a subject matter expert at the Center, the project director or assistant director, and a research assistant--independently read all the material, focusing on material relevant to each informant's views about ideal curriculum, then reading written comments and transcript data pertaining to informants' views about the most widely used current curriculum series. Researchers took detailed notes and prepared summaries of each expert's views prior to participating in meetings where possible differences in these interpretations were discussed and resolved. The final reports of each expert's opinions thus reflect a shared understanding of what each expert said about ideal and actual curriculum.

In the discussion presented below, the focus is on commonalities and differences in experts' views about curriculum both within and across subject matter domains. I will start with a brief overview of the findings from each of the separate studies, followed by a more extended treatment where views are explicitly compared and contrasted.

Views about Ideal and Actual Curriculum in Elementary Mathematics

Across university-based and teacher experts, there was widespread support for the general constructivist notion that students must fashion their own understanding in mathematics. Beyond this general agreement, however, the experts had quite different views about the constructive nature of the learning process and the role of the teacher in helping students construct their understandings of mathematics. Specifically, it was obvious that the experts differed considerably in the relative emphasis assigned to (a) the formal symbol systems of mathematics and their underlying meanings or semantics, (b) the mathematical understandings (sometimes informal understandings acquired in out-of-school settings) of the individual, and (c) the various settings in which mathematics is useful for solving problems. What was "figure" for one expert with regard to these features was "ground" for another.

Much of the difference between experts, whether university-based or school-based, can be captured by single, complex dimension: the extent to which they regard learning as an internalization process or one that grows out of a "negotiation" process that involves the dialectical interplay between individual and socially agreed upon understandings. According to the internalization view, externally represented mathematical relationships form the basis for more formal, and internal, mathematical language and relationships. This stance strongly appealed to two of the university-based experts; it

garnered more moderate but still positive support amongst two of the three teachers. The converse of this "outside-in" view is one that places more of a premium on the socially mediated construction of meaning. The expert who subscribed most wholeheartedly to this view argued that "one cannot transport conceptual structures from one person's head to another through language, actions, or any source of perceptual signals." The teacher's task, according to this view, is to try to understand the student's understandings--and then to prod the student into new ways of thinking by posing questions or structuring situations that will help the student confront the limitations of his or her thinking.

In terms of the most widely used mathematics curriculum (Addison-Wesley Mathematics, 1987, Menlo Park, CA) all of the experts were critical of its overly mechanical approach to computation and its inattention to the conceptual underpinnings of the mathematics being taught.

Views about Ideal and Actual Curriculum in Elementary Social Studies

Differences among the three university-based social studies experts were observed not so much in the content of the ideal curriculum they constructed around a representative set of goals, but more in their views on teaching and learning. One, for example, advocated a case-based, inductive approach to teaching social studies, while another preferred a deductive approach that emphasizes careful teaching of concepts and principles derived from the disciplines prior to involvement in problem-solving activities. In contrast to the content emphasis of the researchers, the teachers placed more emphasis on activities, which they saw not only as providing opportunities for students to extend and apply knowledge acquired in other ways (the major rationale for the researchers) but also as arousing interest, providing a vivid and memora-

ble context for learning, helping teachers address individual differences, and generating a richer set of data for assessing student learning.

More generally, the teachers tended to focus on the child in their discussions of ideal and actual curricula, whereas researchers tended to focus more on the content. This is evident, for example, when one attempts to specify connections between the various activities suggested by experts and the network of key ideas they were asked to provide; this is more easily done for researchers than for the teacher experts. Both sets of experts raised similar concerns about the most widely used contemporary elementary social studies curriculum series (Silver-Burdett & Ginn Social Studies, 1988, Morristown, NJ), criticizing it as a parade of facts rather than a network of knowledge, skills, and dispositions built around key ideas treated in sufficient depth to promote understanding.

Views about Ideal and Actual Curriculum in Elementary Science

The three university experts in science were selected to represent different prominent perspectives, including a conceptual change orientation, a science-technology-society orientation, and a constructivist perspective. The written and transcript data revealed, however, that all three experts drew from a constructivist theory of learning in their deliberations about ideal science curricula. In addition, they all drew from the conceptual change line of research on teaching and learning, advocating a curriculum that focused on children's ideas, thinking, and experiences--one that promoted depth of understanding as opposed to mere exposure. Research experts nevertheless differed in the kinds of instructional models they articulated. Although sharing common features, the models varied in the degree to which they were either generic or much more specific to science teaching. Not surprisingly,

the experts with the most detailed instructional model provided the most elaborate description of desirable student thinking.

Teacher experts mirrored researchers in that there appeared to be greater consensus about "content" (i.e., the important ideas associated with each of the suggested goals) than there was about "method." Teacher experts, in particular, differed in the extent to which they emphasized a process, "hands-on" approach to elementary science. The three teachers were all greatly influenced in their thinking about curriculum by their experiences in professional activit.es outside the classroom. In two cases, the teachers were involved with university researchers who helped them look at their teaching and their students' learning from a conceptual change perspective. The third teacher was involved in state level work in the development of science curriculum guidelines. The two different kinds of interactions had very different kinds of impact on the teachers' ways of thinking about the ideal science curriculum.

Ideal Elementary Curriculum in Literature

Three recurrent themes emerged in the written documents regarding ideal curriculum produced by our literature experts. (Note: Because there is no widely used elementary-level curriculum series in literature, the interview phase of this study was omitted.) The first theme focused on the affective component of literature. Affective outcomes--developing a love of reading, using literature to foster knowledge of and empathy for other people--figured quite prominently in experts' thinking about the ideal literature curriculum. A second major theme related to critical thinking. All the experts stressed the importance of getting students to develop appropriate criteria for evaluating literature. One way to approach this is through instruction on the various components of a particular genre. The third theme that one can detect

in experts' deliberations is the importance of providing opportunities for students to read a variety of genres of literature.

There was a fair amount of agreement about the importance of each of the three factors discussed above at the broad stroke level. As with other subject matter domains, however, there was considerable disagreement regarding the specifics of implementation. For example, experts had disparate views about the role of students' background knowledge in learning to appreciate different types of literature--and how this should be taken into account; they also disagreed about the types of questions that should be used to elicit various responses to literature.

Ideal and Actual Elementary Curriculum in Music

Both university and teacher experts in music agreed that in-depth attention to fewer concepts or key ideas promotes more meaningful learning than superficial coverage of a host of topics and activities. Experts differed, however, in the particular approaches they took to ideal curricula, both within and across disciplinary domains. In general, those who had developed strong theoretical commitments to teaching and learning were more confident in making statements about ideal curriculum than those who had not. A good example of the former is a music expert who based her views about ideal curriculum on a well-articulated scheme for learning that began with enactment (using the body to understand a concept such as high/low pitch), moved through "iconic" understanding (nonmusical visual symbols that correspond to musical symbols), ending with authentic symbolic representation (reading musical notation).

In contrast, most of the experts relied on a potpourri of ideas from a variety of theoretical perspectives; given this proclivity to pick and borrow,

they were unable to articulate a single, coherent approach to ideal curriculum. Teacher experts were more apt to draw from a variety of ideas and resources than were university experts; they reasoned thusly: "To reach all students, a variety of approaches are needed." With regard to content, music experts had a more difficult time than visual arts experts in categorizing and ordering key ideas (e.g., explaining why, for example, one might teach rhythm concepts before pitch or melody concepts). Some of this difficulty is due to the complex nature of music itself. Because music has simultaneous qualities (temporality and simultaneity), some understandings are difficult to tease apart and sequence or order. Teacher experts were more concerned than university experts about integration--that is, connecting student experiences in their disciplines with other school subjects and activities; they also appeared to assign a higher priority to affective goals in thinking about the ideal curriculum. Finally, while all the experts considered activities like listening in music and viewing in art to be active, constructive endeavors, the teacher experts were more apt to combine these activities with performance activities.

Ideal and Actual Elementary Curriculum in Art

All of the experts agreed with the key features presented. They all viewed art as a distinct and valuable way of knowing. The teacher experts were less inclined than the university-based experts to place limits on what they regarded as grist for the art mill: Art was seen as social studies and as other areas of the curriculum as well by this group. The development of connections across subjects was a common theme in the approach to art characteristic of the teachers. This assumption, of course, is not unique to art teachers; it is an assumption made by most teachers who advocate more fully "integrated" curricula.

All of the teachers emphasized the importance of context: Students should be made to see the relevance of art to their daily lives; local artists and other resources such as museums and field trips should be a primary mechanism for making these connections. Another theme which emerged in analyzing the writing and interviews of teachers is the extent to which they placed a priority on studio-related activities. This may reflect the fact that the bulk of art teachers' preparation is in studio art as opposed to art history or criticism. This is not to say, however, that the teacher experts focused entirely on the manipulation of tools or media. They emphasized the development of individual students' perceptions and their use of key ideas in art, such as that "the history of art parallels the history of the world." All in all, there was a strong focus on child development, creative expression, and the promotion of individualism. Much less attention was paid to having students view and respond to great works of art; the systematic and formal analysis of elements of design in works of art was noticeably absent. Finally, a common finding across teachers is that they were relatively uncritical in their assessment of student learning and understanding. None of the teachers, for example, engaged in very meaningful or creative forms of assessment such as writing logs, portfolios, small-group simulations, or critical dialogue.

The university-based experts, in contrast to the teachers--who might be labeled "student centered"--assumed much more of a disciplinary-based, subject centered approach. Both believed that the primary purpose of art education is to foster student understanding of works of art. They agree that the students' primary attention should be focused on selected artwork as an organizing factor in promoting student discourse and studio activity. Art making is thus viewed as a complementary vehicle for carrying out aspects of inquiry or

problem solving. As one of the two experts explained, art appreciation is a by-product of one's understanding of art. Studio or art production is a way to "situate" or make more relevant the learning of key aspects of art knowledge (i.e., criticism, history, aesthetics). One of the two experts prefers a more scientific approach to this knowledge acquisition; students acquire important concepts or principles as they learn to apply them in the processing of solving certain, carefully selected "instructional problems." The other expert takes a less linear or logical approach--stressing, for example, the need to take into account students' personal viewpoints and prior knowledge in what is viewed as a more holistic inquiry-oriented experience.

One point of agreement across the university and school-based distinction relates to the adequacy of existing art curricula: All the respondents voiced severe reservations about existing commercial curricula; they all would hesitate to rely on this material in their day to day teaching.

Commonalities and Differences in Views

Despite some obvious differences in how experts approach curriculum in different subject matter domains, there are some interesting commonalities as well: Virtually all of the experts endorsed a view of learning that stresses the importance of students being actively involved in their own learning, and the crucial role that prior knowledge and experience play in the learning process. Not surprisingly, however, there was more divergence of opinion--both between and within each of the subjects--about how best to promote this type of learning. Teacher experts tended to place more stress on the importance of motivational/attentional factors in this regard; this may be why activities figured so prominently in their thinking. Researchers appeared to lay more stress on the "prior knowledge" aspect of learning. The organization

of content--the sorts of relationships that exist between key ideas--is seen as the most critical curricular variable.

In a similar vein, teacher experts appeared to be less concerned about the inadequacies of the widely used textbook series, viewing this material as a resource that must be supplemented; most estimated that it accounted for only about a third of what they did. Finally, while there were obvious differences of opinion between experts at both philosophical and pragmatic ends of the discourse continuum as regards ideal curricula, there seemed to be more agreement near the "middle." Thus, given a particular goal within a content domain (e.g., "Developing an understanding of how living things interact with other living things and with their physical environment" in science), there was a fair amount of consensus regarding the "big ideas" that children must understand in order to reach the goal (i.e., the notion of energy flow within an ecosystem). This has implications for how one might best utilize experts in the process of curriculum development.

Acceptance of Suggested Criteria for Ideal Curriculum

One point worth making early on is that all of the experts expressed sympathy with the features of ideal curriculum as they were presented for critique, qualification, or further elaboration. Across all the experts in the five subject matter domains there was universal acceptance of the five proposed criteria. Several experts, most notably the teachers, wanted to broaden this list to include factors like motivation and the need to integrate subject matter knowledge across different disciplinary boundaries. One teacher, for example, emphasized that "motivating students is a key feature for curricula, but often textbooks fail at this endeavor." Others talked about the need to address individual differences in the curriculum. This, of course, is consistent with the notion that teachers focus more on the student

when thinking about curriculum while university faculty assign a relatively higher priority to content concerns.

A few individuals--particularly the more constructivist-oriented university-based experts--took exception to the way we framed one set of instructions. Experts were asked the following question with regard to the three representative but important goals we suggested: "How would you organize the key understandings and generalization (related to each of the goals) to present them to students?" One university-based expert in social studies explained, "I disagree with the premise of this task. It seems to me that the task is not to organize these ideas for presentation to students, but to organize the curriculum in such a way that these ideas are likely to be constructed by students." This same concern was voiced by one of the teacher experts in mathematics, who commented, "The idea of organizing or ordering the key understandings makes it sound as though the teacher holds the power for making understanding happen in children by the proper sequencing of key ideas."

This disagreement aside, however, the amount of consensus about what is wrong with existing curriculum material in each of the subject matter areas was truly remarkable. There was also agreement at a very general level about what needs to be done to rectify the situation. All the experts strongly endorsed the "less is more" notion as it applies to curriculum: that is, they agreed that curriculum should focus on a limited number of key understandings, and that those understandings should be taught in much greater depth and with much more active involvement on the part of students than is currently the norm. There also seemed to be a surprising amount of consensus among the experts about just what those understandings might be.

For example, in mathematics, multiplication was selected as a good site to test for common understanding among experts. Thus, one of the three goals presented to respondents was "developing a conceptual understanding of computation (i.e., multiplication), which includes being able to justify the carrying out of arithmetic operations on numbers of various types." All of the experts recognized a common problem in teaching multiplication. This is the misconception that multiplication means things get bigger, which they attributed to the tendency to stress the similarities between multiplication and addition in the early grades. The experts thus focused on alternative meanings for multiplication--such as "array" or "ratio."

A second example may be helpful. One of the representative but important goals that experts responded to in social studies was basic to that domain: developing an understanding and appreciation of our form of government. While experts had different ideas about how one might teach to this goal, there was a fair amount of agreement about what constituted the most important understandings in this regard: First, all the experts wanted students to understand the pivotal role that democracy has played in our own country's development; second, they thought students should appreciate the fact that our form of government is unique because of the primacy it assigns to basic human rights, both as a guiding principle and as a cornerstone of government (i.e., the Bill of Rights); third, all the experts stressed the fact that it takes special qualities on the part of our citizenry to make our form of government work. On this last point, there was some divergence of opinion about what attributes are most important--with some experts wanting to emphasize responsibility, others leadership.

At a broad-stroke level, however, there was good agreement about the conceptual lay of the land. It should be emphasized that we provided the

general goals for the conceptual analysis part of the written response in each subject matter domain. It appears that, if consensus can be reached about these goals, it is possible for curriculum developers to reach agreement at the next, important level of abstraction--the key idea level.

Differences in Specific Approaches

Despite agreement about what is wrong with existing, widely used curriculum material, and despite a fair amount of consensus about what the substance of the curriculum might be given certain representative but important goals, there was considerable difference of opinion about how to improve current practice at a more concrete level. This difference of opinion surfaced in the sample lessons designed by experts and in the personal examples they used to illustrate their views about more ideal teaching/learning situations. As is evident from other papers discussing Center work on ideal curriculum, many factors combine or interact to influence educators' views about curriculum. One set of important differences relates to the researcher versus practitioner distinction. These differences are not so great as to connote two different "cultures," as Leming (1989) suggests, but they nevertheless could serve as an impediment in collaborative efforts to develop curriculum. It is important in this regard that both researchers and teachers come to understand and appreciate each others' perspective.

In general, the teacher experts approached curriculum planning more with the child in mind. Their views about learners appear to be shaped by current thinking within the practitioner community. Thus, variables like "learning style," "self-esteem," and "motivation" play an important role in teachers' deliberations about curriculum. The university-based experts, in contrast, are much more influenced by current debate and controversy within their subject matter communities--much of which relates to the nature of knowledge

and of the learning process. This is not to say that their thinking is somehow more "correct" than that of the teachers. As will become evident, the university-based experts are just as prone to fashion their own, often idiosyncratic understandings of what this discourse is about as are the teachers.

With student factors front and center, it is not surprising that teachers often appeared to be more eclectic than the university-based p+25Xexperts in their approach to curriculum design. As one teacher so aptly put it, "To reach all the students, a variety of approaches are needed." A potential drawback to such eclecticism is the lack of commitment to any one approach--and a tendency to dismiss as irrelevant the need to examine carefully the assumptions upon which each approach is based. Most of the university-based experts, in contrast, evidenced admirable commitment to a particular approach to curriculum--and they were more prone to justify their views by making explicit their assumptions about subject matter and the learning process. In the process, however, they appeared to minimize somewhat the importance of contextual factors such as the time constraints teachers work under when planning and teaching lessons, class size, and student individual differences.

The teacher experts. Virtually all of our teachers felt there were compelling reasons to want to improve on traditional practice. One teacher, who worried a great deal about issues of equity and access in mathematics, talked about the negative effects of ability grouping. "After a couple of years of being assigned to the lowest group," she said, "those kids' expectations are not high. By the time I get them [fifth grade], they know they're no good in math and they're going to fail. It's very difficult to turn that attitude around." She went on to explain how important it is to use fundamentally different approaches with these students; by this, she meant more than

attempting to accommodate to different "learning styles:" "We may be thinking about whether they're auditory or visual, but we're not thinking in terms of changing methodology."

One of the social studies teachers elaborated on this notion: "Motivating students," she said, "is a key feature for curricula, but often textbooks fail at this endeavor. . . . Part of this comes from pushing facts instead of concepts, as so often happens in social studies." Thus, the pervasive sense that traditional approaches have failed to meet the needs of students--largely because they are based on a dry, transmission model of teaching--apparently served as the incentive for teachers on the various panels to begin to strike out on their own.

One question that we asked all teacher experts was how much they relied on traditional textbooks in their own instruction. They all replied, "Not much," giving estimates that ranged between 20 and 40%. Mostly, this material was seen as a resource, useful in supplying students with some of the information needed prior to engaging in important activities or in completing major projects. Most of the teacher experts were thus committed to an activity or problem-solving approach to the teaching of various subjects. One of the science teachers explained: "What I've found is once the kids are hooked with the activities, then you go back to the reading and all of a sudden they're really interested and it's just not reading." He continued, "The kids in my classes that have gone through an activity-oriented program are motivated to read and to dive into the content--and they retain more than a memory-based program of paper and pencils and worksheets." Similar things were heard from teachers in the other subjects as well. As a teacher in mathematics explained, a problem-oriented approach provides a rationale for

what it is that students are being asked to learn: "Once they see the need to be able to do some of these things, they are much more motivated to do it."

Many of the teacher experts insist that an activity-based curriculum is the best way to meet multiple needs in students: As the above quotations indicate, activities are viewed as good motivators; they also "personalize" the learning, making it more concrete and memorable. Not all of the teachers were quite so enthusiastic about this approach, however. One mathematics teacher stressed the importance of carefully picking problem situations. It is insufficient to simply develop a collection of interesting activities, she cautioned. "A lot of what I see in problem solving," she said, "is, 'Here's another cute activity and, wow, this is really fun!"

This concern, which was also voiced by university-based experts, surfaced in comments made by one of the science teachers: Expressing chagrin at how many of the process-oriented activities in science seem pointless from a conceptual perspective, he added, "It's like they have the idea that comparison and classification are the end all and be all. It's like they almost suspect that if you do those things over and over enough that you're going to learn how to be a scientist." He then went on to make what seems like an especially important point, "To me, it doesn't seem like it's a specific science skill so much as it is something that you do with a lot of ideas that you're working with." Thus, within the teacher group, there is some concern about the link between activities and content. This same concern surfaces in the case of the university-based experts, but the particular arguments they make can be more directly traced back to ongoing, epistemological debates within the various disciplines.

The university-based experts. With rare exception, <u>all</u> of the university-based experts, particularly in science, mathematics, and social

studies, identified themselves as "constructivists." While this term appeared to be interpreted in various ways, there was some agreement at a general level about what it meant: The learner must fashion his or her own understanding of the content. As one mathematics researcher explained, "The teacher has to understand that it's not possible just to tell the child mathematics; the child has to be actively involved in the learning of mathematics--the activity of the child is critical." Another expert in social studies echoes this notion: "The central issue after what knowledge is of most worth," he said, "is whose knowledge."

Despite apparent adherence to a common set of theoretical beliefs about teaching and learning, the university-based experts evidenced considerable diversity in their specific approaches to curriculum. This diversity appears to reflect differing views about constructivism, the learning process, and the nature of knowledge--views that surface only occasionally in the interview responses of the university-based experts, and rarely, if ever, in the teachers' discourse. There was not much inclination even on the part of the university-based experts to discuss these issues. This may be because of the way we framed the task, or how we conducted the interviews--or it may be because university-based experts take these issues for granted. Nevertheless, different views about subject matter seemed to lie behind much of what the university based experts had to say about curriculum.

Dewey's (1966/1902) distinction between "knowledge" and the "record of knowledge" may be pertinent here. In each subject matter domain, some of the university-based experts appeared to emphasize the former--the body of conceptual and procedural knowledge developed and applied by those in the disciplinary community. Although not viewed in static terms--indeed, many of these experts stressed how much room there is for choice in drawing on this

body of knowledge--there was still a clear sense that the knowledge is out there, in codified form, an important aspect of our cultural environment with which students must come to terms. One of the university-based experts in mathematics stressed the importance of students learning formal knowledge; this knowledge, she believes, has to be carefully provoked in students through a kind of cognitive modeling process: "Schools were designed to make short-cuts to learning formal knowledge."

It is important for teachers to build on students' informal knowledge (a key tenet of the process approach described below), but it is also important to know where previous experience does not coincide with the formal system: "Otherwise," she added, "we would not need the formal system. . . . We need the formal because there is some limitation to the informal and we want to give additional tools." The two university-based experts in art stressed the importance of formal, disciplinary knowledge to a greater extent than did teachers, who tended to stress art making or art production. Nevertheless, there was a discernible difference in the degree to which the two university experts viewed art knowledge as external and fixed versus subject to further negotiation and argumentation.

A focus on the record of knowledge tends to correspond with the traditional distinction between content and process, conceptual and procedural knowledge. This distinction is evident in some of the discourse provided by the university-based experts. One of the science educators commented as follows: "It seems to me that whatever you want people to learn in science . . . it's going to have a component that has to do with the content of the domain and a component that has to do with something like reasoning or problem solving." Highlighting the distinction between content and process

appears to be associated with a fairly traditional view of the role that activities or problems play in the teaching/learning process.

Activities or problems, according to this perspective, become an occasion for one to apply or transfer knowledge acquired in another context. The problem situation becomes a kind of "frosting on the cake," important but not integral to the teaching/learning process. One of the researchers in mathematics, a strong advocate of the use of instructional representations to model important concepts and procedures in mathematics, explicitly contrasted her approach--which she termed "meaning-based"--with a problem-solving approach. While she felt that certain "components" of the problem-solving approach were important and worth teaching, she had her doubts about how much of the curriculum should be given over to this sort of activity. She favored focusing on the modeling first, then letting students creatively apply the knowledge later.

The learning mechanism that underlies this particular brand of "constructivism" is that of internalization. Understanding comes from careful reflection on various representations and models that help to instantiate important concepts and procedures. Subject matter knowledge lies outside the individual. The teacher establishes conditions that allow students to observe or discover this reality. As pointed out in the mathematics paper, the "constructivism" in this approach is related to the belief that this process cannot be entirely imposed from without. As Resnick (1987) explains, "[The] aim is to place learners in situations where the constructions that they will inevitably make will be powerful and correct ones, constrained by the principles that govern a domain" (p. 47). It is possible, however, to design instructional rep ntations that are so "transparent" as to guarantee

virtually that learners will make certain kinds of sense out of the situations to which they are exposed (Resnick, 1983).

Alternatively, a number of the university-based experts place more stress on the process of knowledge construction as it occurs within a social context. According to this second view, meaning emerges from a dialectical process that is both individual and social. This view appears more consistent with the epistemological views set forth by Kuhn, Toulmin, and others. Disciplinary knowledge, according to this set of assumptions, is a socially constructed product. It is continually regenerated and modified by members of the disciplinary community. The university-based experts subscribing to this set of assumptions believe that students can extract most of what they need to know about the discipline in working with others--peers and teachers--provided, of course, that the students are being asked to puzzle about carefully selected problems and tasks. Thus, there is more emphasis on the doing of science, mathematics, or social studies. Activities and problem situations become occasions for the acquisition of new knowledge and skill in this perspective. Thus, one of the mathematics experts talked about how "knowledge emerges from problems rather than the other way around." Teachers can use problem situations to get students to explain how they "know" that something is the case in a way that is convincing to others--a skill which is also "fundamental to the notion of proof."

While the range of curricular practices endorsed by the teachers can be traced back to concerns about meeting student needs, the "eclecticism" evident in the responses of the university-based experts has a different origin. Their diverse views about the role of activity in the learning process appear to be linked to important, and as yet unresolved, epistemological differences within each of the subject matter domains. For this reason, some of the

experts focused more on the "discovery" process involved in transferring knowledge, while others emphasized the dialectical process of "negotiation" that generates that knowledge to begin with.

Other conceptual commitments also played a role in influencing experts' views on ideal curriculum. Several of the university-based experts were quite explicit about how previous experience with novel curricula affected their current views about curriculum, teaching, and learning. Some of the specific examples cited include the inquiry approach to science known as "SCIS" (Science Curriculum Improvement Study), "new math," and the "Taba material" in social studies. One of our experts in science, for example, compared her current attempt to develop "constructivist" curricula with her earlier involvement in the inquiry-oriented science reform: "My model is really quite similar to the way the SCIS materials were developed," she said. The approach she was using with new curriculum was based on stages of learning--exploration, invention, discovery, and consolidation--that closely approximate those used in the earlier effort. This melding of earlier and more current conceptual perspectives appears to be more noticeable in the written and verbal responses of the university-based experts.

Further Differences Between Teachers and University-Based Experts

Teacher and university-based experts differed in less tangible ways as well. The latter group appeared to approach the curriculum development exercise with confidence. Many of the teachers, on the other hand, seemed to be cautious in their recommendations, expressing concern that they might not be providing us with the necessary information, or be able to defend the particular position they took. One teacher, for example, included this somewhat plaintive note in her written response:

> I can't get over the nagging feeling that my response to your study questions is not what you'd needed. I don't like having the feeling that I put so many hours of work into writings that aren't adequate

> for your needs. That's why I tried to get my responses to you quickly--I want you to have time to contact me for further informations if I can redo any of the sections. I was pleased to be asked to be part of this study and I want my contributions to be worthwhile.

One can speculate about why some teachers were hesitant or tentative in advancing their ideas about ideal curriculum. Unlike the university-based experts, they did not often use research to justify their claims. Furthermore, the task itself was a less familiar one for teachers. Those at the elementary school level have few opportunities to engage in the sort of thoughtful reflection about curriculum called for in the instructions.

While many teachers were tentative in proffering their suggestions about ideal curriculum, particularly at the beginning of the interview sessions, they nevertheless quickly warmed to the task. A number of the teachers indicated that they found the exercise to be extremely valuable in advancing their own thinking about curricular issues. One teacher, for example, explained that, for the first time, she had begun to see how the concepts she taught "fit into an overall pattern." This teacher represented science; her comments are worth quoting at length:

> Teachers frequently wonder, Why are we teaching about air? Why are we teaching about water? Why do we teach about the energy of the sun? They're all related. The sun is the cause of the plants being able to make the food. The sun causes the changes that occur in air temperature, et cetera. The energy of the sun is vital to our earth.

Having "worked through the whole thing," this teacher felt that she "had gotten a better feel for why we teach science the way we do." This grasp of the "big picture" helped her understand the logic of the curriculum. "A lot of people," she added, "still feel, 'Oh, we got to do plants this month [i.e., the fall]." She felt that the effort she put into the task was time well

spent: "Putting that extra time in to learn about it makes the whole school year a much more rewarding experience for yourself and the kids."

Although they may have been less comfortable with the task, teachers were more expansive in their outlook. Thus, they were more inclined than the university-based experts to want to integrate across different content domains like mathematics and science. They also were quicker to point out the advantages of teaching skills like reading and writing in the context of other subjects. The university experts tended to honor the boundaries of the subject matter domains in their descriptions of ideal curriculum.

Finally, teachers were more impressed than the university-based experts with the constraints associated with district and state testing programs. Teachers recognized the importance of children performing well on standardized tests, even though they had reservations about the extent to which they measured the sorts of outcomes (i.e., conceptual understanding and higher order thinking) that they most valued as teachers. Teachers also appeared to be more comfortable with the notion of a "spiral curriculum" than their university counterparts. They assumed a certain amount of redundancy in content from one year to the next, and therefore seemed less concerned amount the immediate mastery of all relevant knowledge and understanding. The university-based experts were less enamored with the spiraling notion, believing that the key understandings should be given adequate coverage when first introduced--thus alleviating the need for what they regarded as unnecessary duplication.

Implications for Curriculum Development

The fact that there were differences in viewpoint between teachers and university-based experts about ideal curriculum is not surprising. In fact, had we not selected teachers and researchers in the way that we did, these

differences may well have been greater. Both sets of experts were knowledgeable about both teaching and learning in elementary classrooms and were "specialists" in one of the content areas. Despite these similarities, important differences in perspective were found. As Eisner (1979) points out, this difference can be resolved in two ways: Through accommodation and compromise or through "encouraging the contending parties to penetrate more deeply into the values that animate the controversy" (p. 276). It is hoped, the sort of research being reported on here will contribute to this second way of resolving differences.

House (1987) conducted a similar study involving educators and high school teachers in social studies; unlike the present study, however, he also included disciplinarians in the social sciences (i.e., political science and history). House noted a fair amount of consensus among the social studies educators and political scientists regarding "key concepts" in their respective fields, less so among the teachers and historians. In the present study, we have noted a greater degree of consensus across experts regarding the substance of what should be taught in the various subject matter domains than appears to have emerged in the House study. This may reflect the fact that we dealt with a different level (i.e., elementary school versus high school), and that we structured the task differently, presenting three representative but important goals to each respondent as a way to focus their analysis. As in the House study, there was universal agreement on one important issue: The inadequacies of existing curriculum material. House (1987) expressed it this way, "Virtually everyone thought that high school texts were dull, distorted, avoided controversial issues, and were generally inadequate" (p. 80). He added that this pejorative view was shared even by those who had worked on or edited high school texts.

In the present study, the fact that there is some consensus about what is wrong with existing curricula, and about what ought to replace this scattered and incoherent material, should be taken as an optimistic sign. One way to think about the results obtained above is imagine a continuum ranging from the concrete to the abstract. Along this continuum, one might array a number of the issues and concerns raised above. Epistemological issues and related questions about teaching and learning would be located at the more abstract end; more practical concerns about the organization and delivery of curriculum--and how one addresses individual needs while ensuring equal access to content--would fall at the more concrete end of the hypothesized continuum. The set of substantive concerns dealt with by the experts during the conceptual analysis part of the exercise would thus fall somewhere in the middle. It is at this point along the continuum that one would hope to find some consensus among university-based and teacher experts.

The fact that consensus was found at the midpoint of the continuum bodes well for future, collaborative efforts aimed at developing better curricula. If, in fact, educators and teachers in the different subject matter domains can agree on the key understandings associated with various goals, it could provide an important starting point for what are sure to be more contentious discussions about the abstract and concrete issues dividing these two groups of individuals. Without this common ground, it is less likely that individuals will be willing to invest the time and effort necessary to resolve these issues. All of this, of course, assumes that curriculum planning and development is a much messier process than is commonly assumed. As Eisner (1979) reminds us, it is easy to "underestimate the qualities of playfulness, humor, and artistry needed to do really excellent work in the curriculum field" (p. 274).

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